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REMITTANCE INFLOWS, POVERTY AND ECONOMIC GROWTH IN TANZANIA: A MULTIVARIATE CAUSALITY MODEL

Mercy T. Musakwa¹ and Nicholas M. Odhiambo

Abstract

The study examined the causal flow between economic growth, poverty, and remittances in Tanzania, using annual data from 1990 to 2020. Tanzania is working to achieve the policy targets set in its Vision 2025, and the findings of this study will add value to policy effectiveness and timing. The study uses household consumption expenditure per capita (HCE) as a measure of poverty, the rate of change in GDP as a measure of economic growth, and remittance inflows as a percentage of GDP as a measure of remittances. Using the autoregressive distributed lag (ARDL) approach to cointegration and ECM-based Granger causality, the study found a bidirectional causality between remittances and poverty in the short run and a unidirectional causal flow from remittances to poverty in the long run. No causality was found between remittances and economic growth and between economic growth and household consumption expenditure per capita. The findings of this study point to the importance of remittances in poverty reduction and sustainable development in Tanzania. Policy implications are also discussed.

Key Words: autoregressive distributed lag (ARDL); economic growth; poverty; remittances; Tanzania

JEL: I32; I31; B22

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1. Introduction

The resilience of remittance inflows, even during major economic disruptions such as the Covid-19 pandemic, has prompted interest in how this source of external funding can be harnessed to put economies back on the pre-pandemic track. ‘Righting the ship’ will help them achieve the targets of the United Nations’ Sustainable Development Goals (SDGs) (United Nations [UN],2022). Remittance inflows to low-and middle-income countries were projected to reach US\$589 billion in 2021 (World Bank 2021). Remittances in low-and middle-income countries are now three times more than the official development assistance (excluding China) and 50 percent higher than foreign direct investment (World Bank, 2021). The top five remittance recipients in 2021 were China, India, Mexico, the Philippines, and Egypt (World Bank Group, 2021). Sub-Saharan Africa is anticipated to register a recovery from the 14.1 percent slump in 2020 (World Bank, 2021). Although some downsides are associated with strong remittance inflows (e.g., high remittance costs, the high cost of migrant recruitment, and the dissipation of the fiscal stimulus put in place to relieve the economic disruptions caused by Covid-19), remittances are expected to firm in 2022 (World Bank, 2021). On the back of a positive outlook on remittance inflows and concerted government efforts to steer their economies from the negative effects of the pandemic, can remittances be the panacea governments are looking for?

There is a vast body of literature on the impact of remittances on poverty (see Musakwa and Odhiambo, 2019, 2020a and 2020b; Azam, Haseeb, and Samsudin, 2016); the causality between the two (see Azam et al., 2016; Yasmin, Hussain, Akram and Yasmin, 2015; Gaaliche and Gaaliche, 2014); and the impact of, and causality between, remittances and economic growth (see, e.g., Depken, Radic and Paleka, 2021; Jouini, Mabrouk and Mim, 2021; Nyasha and Odhiambo, 2020). However, most studies have examined these three factors separately,

while very few have examined the causality between the three. That is important in formulating policies that aim to fully exploit the benefits of remittances in terms of poverty alleviation and economic growth. Moreover, the findings from different investigations into the causality between remittances, poverty, and economic growth are inconclusive. Some point to the benefits of remittances to households through the smoothening of consumption. The extent to which remittances benefit the poor at a national level is, however, subject to social institutions structures (Ratha, 2013; Chami, Dalia and Montiel, 2009) and the development of the financial sector (see Giuliano and Ruiz-Arranz, 2005), thus indirectly linking remittances to economic development as a source of financing investment and other social services. This points to a need for additional research, as each country has stylised factors that make this seemingly obvious relationship debatable, even in Tanzania. This prompted a fresh perspective on the causality between remittances, poverty, and economic growth.

The current study, therefore, aims to examine the causality between remittance Inflows, Poverty, and Economic Growth in Tanzania using the Human Development Index (HCE) as a measure of poverty. Although poverty can be measured in terms of income and non-income aspects, the HCE was selected for its ability to cover three dimensions of poverty: education, standards of living, and health outcomes. To minimise the omission of variables, trade openness and inflation have been added as intermittent variables, leading to a multivariate Granger causality framework. An autoregressive distributed lag (ARDL) approach to cointegration and the ECM-based Granger causality test have been employed to explore that relationship. The ARDL approach has been selected because of its multiple advantages. For example, it is robust in small samples. In addition, it provides results in short- and long-run timeframes, thereby making the policy more effective.

Tanzania was selected for this study because it is among the African countries that have received modest remittance inflows, on average below one percent of gross domestic product (GDP) (World Bank, 2022a). Therefore, this study seeks to answer one critical question: Should Tanzania roll out policies to support remittance inflows to advance its national policy, focusing on poverty alleviation and economic growth? Further, given the national policy, Vision 2025, and its poverty alleviation policy thrust, this study will add value to policy formulation, which is aligned to the realisation of economic growth and poverty reduction, whilst harnessing remittances to achieve these goals.

The remainder of this article is structured as follows: the next section outlines country-based and related literature. Thereafter, estimation techniques and variable definitions are provided in section 3. Section 4 presents and discusses the results. The final section, Section 5 concludes the study.

2. Literature review

2.1 Country-based literature

Poverty

Poverty reduction in Tanzania is engraved in the National Strategy for Growth and Reduction of Poverty (NSGRP II), also known as Mkukuta, starting with Mkukuta I, which was rolled out in 2005/06–2009/2010, and continuing with Mkukuta II, from 2010/11–2014/15 (Ministry of Finance and Economic Affairs [MFEA], 2010). Under Mkukuta I, Tanzania made positive strides in economic growth, while in terms of poverty alleviation, progress was achieved in the provision of social services, such as education and health (MFEA, 2010). Notably, all the areas that did not perform as expected were replicated in Mkukuta II, emphasising aligning ministries' strategic plans with Mkukuta, strengthening government implementation

capacity, establishing private sector partnerships, and evidence-based planning and resource allocation (MFEA, 2010). Mkukuta II provided a framework for rallying national efforts and accelerating poverty reduction through intentional pro-poor interventions (MFEA, 2010). This has become a medium-term mechanism for achieving Tanzania's Vision 2025. The First National Five-Year Development Plan (2011/12–2015/16) was implemented concurrently with Mkukuta II (Ministry of Finance and Planning [MFP], 2021). Currently, Tanzania is implementing the third National Five-Year Development Plan (2021/22–2025/26) (MFP, 2021). Mkukuta I and II shared the same policy focus on accelerating growth through pro-poor interventions and building an economy that facilitates private-public partnership and a shared vision among all Tanzanians (MFP, 2021). It is envisaged that economic growth will provide the resources needed to support the flagship projects of Vision 2025, moving Tanzania into a middle-income country, and serving to alleviate poverty in that country.

Tanzania has made progress in reducing poverty in respect of both income and non-income dimensions, with improvements in education, health, and general access to services. Although progress has been made in reducing income poverty, the rural population remains worst affected (MFP, 2021). There are increasing calls for intentional government policy on development to include the poor. Poverty, as measured by a poverty headcount of US\$1.90 a day, declined from 72.3 percent in 1990 to 49.4 percent in 2018, while the poverty gap/severity decreased from 30.8 percent in 1990 to 15.6 percent in 2011 before increasing by 0.3 percent in 2018 (World Bank, 2022a). Thus, poverty severity in Tanzania worsened during the period 2011–2018 (World Bank, 2022). When the poverty headcount at US\$5.50 a day, Tanzania registered a decline from 98.2 percent in 1991 to 91.8 percent in 2018 (World Bank, 2022a). Despite a decline being recorded, poverty levels remain very high (World Bank, 2022a). The HCE, a composite measure of living standards, health, and education, improved from 0.368 in

1990 to 0.529 in 2019 (United Nations Development Programme [UNDP], 2022). An average HCE of 0.44 was recorded during the study period, making it very low compared to leading countries such as Norway, whose HCE averaged 0.7 during that time (UNDP, 2022).

Economic growth

Over the past two decades, Tanzania has achieved sustained growth, culminating in the country graduating from a low-income to a lower-middle-income status (African Development Bank [AFDB], 2022). Economic policies are backed by the broad Tanzania Development Vision 2025, implemented through the Long-term Perspective Plan (2011/12–2025/26), which is subdivided into three five-year national development plans (MFP, 2021). The country is amid the third five-year development plan, which envisages establishing high-quality livelihoods; good governance; peace, stability, and unity; a well-educated and learning society; and a competitive economy capable of supporting sustainable growth and sharing the accrued benefits (MFP, 2021). The third five-year national plan focuses on addressing poverty levels, building the country's production capacity, increasing competitiveness in trade and investments, fostering human development, boosting foreign investment, and facilitating public-private partnerships (MFP, 2021). Tanzania has witnessed an increased inflow of foreign direct investment (FDI) in the mining sector, finance and insurance, food and accommodation, manufacturing, and agriculture (MFP, 2021). In 2016, Tanzania received US\$755.4 million in FDI, and this figure has grown consistently to register US\$990.6 in 2019 (MFP, 2021).

Growth slowed in 2020 to 2.1 percent – a drop from the 6.8 percent realised in 2019 (Africa Development Bank [AFDB], 2021). Inflation also declined from 3.5 percent recorded in 2019 to 3.3 percent in 2020 (AFDB, 2021). However, according to the AFDB (2021), the economic

outlook is positive, with a 4.1 percent growth rate for 2021 and 5.8 percent for 2022, mainly due to the reopening of trade corridors and the tourism sector. These projected economic milestones come at a time when the country has received modest remittance inflows that are anticipated to become stronger in the near future.

Remittances

Migration has become increasingly common, as people move around seeking greener pastures in other economies or migrate to settle in politically stable countries. The United Nations' Universal Declaration of Human Rights under Article 13 spells out the right to freedom of movement and residence within a border and the right to leave any country – including one's own – and return to it (Shitundu, 2006). Migrants have both a positive and a negative impact on the destination and origin countries alike (Shitundu, 2006), but this study will focus on the positive impact of remittances on the country of origin. Migration facilitates the transfer of skills and contributes to cultural enrichment (Shitundu, 2006). According to Migration Data Portal [(MDP), 2022), Tanzanians' main destination countries between 2005 and 2010 were Burundi, the Democratic Republic of the Congo (DRC), Sudan, Uganda, and Rwanda, with 51 percent of migrants being female. Tanzania is a signatory to the SDGs, which compels it to work towards achieving the 17 identified goals (United Nations [UN], 2022). Tanzania has an obligation to work towards creating a conducive environment for remittance inflows by reducing remittance charges, indirectly encouraging the use of formal channels, and reducing recruitment costs, among other remittance-promoting goals. Like any African country, Tanzania still faces the challenge of using formal channels to remit. Remittance costs declined from 24.31 percent in 2011 to 19.73 percent in 2020 – a marked contrast to other African countries, which registered a decline over the same period (World Bank, 2022b). Although progress has been made in reducing related costs, this rate is still high when

compared to the SDG target of three percent and the current average cost in sub-Saharan African countries of eight percent (World Bank, 2022b). From 1990 to 2020, Tanzania recorded a depressed remittance inflows as a percentage of GDP of 0.4 percent (World Bank, 2022b). The country only recorded remittances slightly above one percent of GDP in 2010 and 2011, which was around the time when it rolled out Vision 2025 and Mkukuta II.

2.2 Review of related literature

The theoretical link between poverty, remittances, and economic growth is derived from remittance as an external source of development finance. A surge in remittance inflows has led developing countries to ponder how they can harness this source of finance to boost economic growth and meet the targets set in the SDGs. According to Adam and Page (2005), remittances stimulate consumption among remittance-receiving households. Lucas and Stark (1985) identify the reasons for migrants remitting back home as coinsurance, savings, and altruistic motives. Migrants tend to remit more resources back home in times of difficulty, such as during the Covid-19 pandemic, which gives this process a countercyclical nature (Ratha, 2013). De Vries (2011) explains that investments in education, health, and business are additional benefits of remittances, augmenting household resources and allowing poor households to access social services that would otherwise have been beyond their reach. Ratha (2013) points out that, on a national level, remittances serve as a source of balance of payment inflow and boost economic growth through the multiplier effect. Although the positive impact of remittances on poverty reduction has received much attention, there seems to be no clear empirical contribution on remittances at a national level. The same can be said for the relationship between remittances and economic growth, which has elicited mixed views: one positive contribution of remittances to economic growth channels is in the form of additional foreign currency, which has a positive impact on the balance of payments; physical capital

investments; the opening of new enterprises; the multiplier effect of an increase in household consumption and investment; an increase in access to social services, health and education; financial development; and human capital development (Jouini et al., 2021). Negative channels include the “Dutch Disease” -when a large influx of foreign currency paradoxically harms a country’s economy through exchange rate appreciation and creates dependence syndrome, which negatively affects productive activities in the remittance-receiving country.

Studies examining the impact of remittances on poverty and economic growth have received much attention since the surge in remittance inflows, especially in low- and middle-income countries, albeit the findings on the causality between remittances and poverty are inconclusive: some confirm a unidirectional causal relationship between the two (see Azam *et al.*, 2016) others found a bidirectional causal relationship (Azam et al., 2016; Yasmin et al., 2015; Gaaliche and Gaaliche, 2014; Hatemi-j and Uddin, 2014), while yet others found no causality (Azam et al., 2016). The same applies to studies that investigated the causality between remittances and economic growth (Depken et al., 2021; Jouini et al., 2021; Nyasha and Odhiambo, 2020). Some researchers have taken a step further and investigated the causal relationship between remittances, economic growth, and poverty in the same study (Abduvaliev and Bustillo, 2020). Given the dearth of research on the causal relationship between remittances, poverty, and economic growth, studies that examined the impact of all three variables, the impact of remittance on poverty and the impact of remittances on economic growth will also be reviewed.

Poverty and remittances

Musakwa and Odhiambo (2020a) examined the impact of remittances on poverty in South Africa, using annual data from 1980 to 2017 and the ARDL bounds approach. The study used household consumption expenditure and infant mortality rate as proxies for poverty. Remittances were found to have a negative impact on poverty, irrespective of the timeframe considered when household consumption expenditure was used as a proxy; no impact was confirmed when infant mortality rate was used as a proxy for poverty (Musakwa and Odhiambo, 2020b). The findings revealed variations in the results, depending on the poverty measure used. Musakwa and Odhiambo (2020b) also investigated the causality between poverty and remittances for Botswana, using data from 1980 to 2017, and employing two poverty proxies, namely the infant mortality rate, and household consumption expenditure. Using the ARDL approach and the ECM-based causality test, the study found a bidirectional causality between the two variables in the long and the short run when household consumption expenditure was used as a proxy (Musakwa and Odhiambo, 2020b). When the infant mortality rate was used as a proxy, the study found a unidirectional causal flow from poverty to remittances in the long and the short run (Musakwa and Odhiambo, 2020b). In a separate study, Musakwa and Odhiambo (2019) investigated the impact of remittances on poverty in Botswana, using annual data from 1980 to 2017. Household consumption expenditure and the infant mortality rate were used as proxies for poverty. Employing the ARDL approach and ECM-based causality test, the study found that remittances reduced poverty in Botswana in the long and short run, when the infant mortality rate was used as a proxy, while no impact was confirmed in the long or short run when poverty was measured by household consumption expenditure (Musakwa and Odhiambo, 2019).

Azam et al. (2016) examined the impact and causality between poverty and remittances for 39 countries from high-income countries, upper middle income countries, and lower-middle income

countries using annual data covering the 1990-2014 period. The study used the Panel Fully Modified Least Squares (FMOLS) and Engle-Granger two-step test to examine the relationship between the two, while poverty headcount was used as a measure of poverty. Azam et al. (2016) reported that foreign remittances had a positive impact on poverty alleviation, but only for upper-income countries. A unidirectional causal flow from poverty to remittances was found in the long run for lower- and upper-middle-income countries, while no causality was confirmed in high-income countries (Azam et al., 2016), showing the inappropriateness of generalising results from one study to another reinforcing the importance of a new study on the nature of this relationship.

Yasmin et al. (2015) investigated the causality between poverty and remittances in Pakistan using data from 1973 to 2006 and employed the ARDL bound approach and vector error correction (VECM). The study used poverty headcount and remittances to GDP as measures of poverty and remittances, respectively. The study found remittances and poverty to be inversely related in the long and the short run (Yasmin et al., 2015). A one percent increase in remittances was found to lead to a 0.03 percent reduction in poverty in the long run and 0.003 percent in the short run (Yasmin et al., 2015). The same study found a bidirectional causality between poverty and remittances in the long run but not in the short run (Yasmin et al., 2015). In the same spirit, Gaaliche and Gaaliche (2014) examined the causal relationship between remittances and poverty in 14 emerging and developing nations, using data from 1980 to 2012. Using non-stationary dynamic panel data, the study found a bidirectional causality between remittances and poverty, and the impact of poverty reduction on remittances was found to be stronger (Gaaliche and Gaaliche, 2014). Hatemi-j and Uddin (2014) found the same results in a separate study in Bangladesh, using annual time series data from 1976 to 2010. The study found a bidirectional causality between the two variables. However, the impact of poverty

reduction on remittances was found to be stronger, while a positive relationship between remittances and poverty reduction was also confirmed (Hatemi-j and Uddin, 2014).

Ekanayake and Moslares (2020) investigated the impact of remittances on poverty in 21 Latin-American countries using the panel least squares and panel FMOLS method. The study further estimated the short- and long-run effects of remittances on poverty using autoregressive distributed lag (ARDL-ECM) and found that remittances lowered poverty levels in Latin America (Ekanayake and Moslares, 2020).

Remittances and economic growth

Jouini *et al.* (2021) examined the causality between economic growth and remittances in two Maghreb countries, Algeria and Morocco, using data from 1970 to 2009. The study identified two channels through which remittances stimulated economic growth, namely human capital and financial development (Jouini *et al.*, 2021). In Morocco, a unidirectional causality was found from remittances to economic growth only in the long run, while an indirect causality was established between remittances and economic growth through a unidirectional causality between human capital and financial development (Jouini *et al.*, 2021). Depken *et al.* (2021) investigated the causality between remittances and poverty in Croatia, using quarterly data from 2000 to 2020 (second quarter). Using vector autoregressive models and Granger causality test, the study found a unidirectional causal link between remittances and economic growth (Depken *et al.*, 2021). In the same spirit, Nyasha and Odhiambo (2020) analysed the causal relationship between remittances and economic growth using data from 1970 to 2017. Employing an ARDL approach within a multivariate Granger causality framework, the study found no causal relationship between the two (Nyasha and Odhiambo, 2020). Those

findings show that the causal relationship between remittances and economic growth is not supported in empirical studies but rather varies from one country to another.

Lacheheb and Ismail (2020) examined the relationship between remittances and economic growth using a panel of 93 low- and middle-income countries, employing annual data from 2009 to 2017 and the Generalised Method of Moments (GMM) (SYS-GMM). The study found that remittances had no significant impact on economic growth after adjusting for outliers and that remittances led to the deterioration of the economy. This finding indicated a negative link between remittances and economic growth, highlighting stagnation and dependence or the so-called remittance trap.

Olayungbo and Quadri (2019) investigated the relationship between remittances and economic growth using panel data from 20 sub-Saharan African countries over the period 2000–2015. Employing Pooled Mean and Mean Group ARDL estimates, the study found remittances to have a positive effect on economic growth in both the short and the long run (Olayungbo and Quadri, 2019). The results of the causal relationship confirmed a unidirectional causal flow between economic growth and remittances. Morton, Panday, and Kula (2012) found the same impact results as Olayungbo and Quadri (2019) in a study of the top 20 remittance-receiving countries, using descriptive analysis where remittances, together with physical capital, human capital, and governance, were found to positively impact economic growth. Jouini (2015) examined the causality between remittances and economic growth for Tunisia, using data from 1970 to 2010. Employing the ARDL approach, the Jouini (2015) study found a bidirectional causal relationship between the two variables in the short run.

Remittances, poverty and economic growth

Abduvaliev and Bustillo (2020) examined the effects of remittances on economic growth and poverty reduction among ten post-Soviet states. Using poverty headcount and poverty severity as measures of poverty, the study found a one percent increase in remittances resulting in a 0.25 percent increase in GDP per capita and a two percent decline in poverty (Abduvaliev and Bustillo, 2020). Remittances contributed to poverty reduction through increased income and the smoothing of consumption (Abduvaliev and Bustillo, 2020).

Zaman, Wang, and Zaman (2021) investigated the relationship between remittance inflows, education, expenditure, energy use, income, poverty, and economic growth, in a panel of nine countries – Bangladesh, China, Egypt, India, Indonesia, Mexico, Nigeria, Pakistan, and the Philippines. Employing data from 1990 to 2014 and the ARDL approach, the study found remittances to have a positive impact on economic growth in the long run, while poverty was found to have a negative effect on economic growth in the long run.

Studies investigating the causality between remittances and poverty and between remittances and economic growth reported inconclusive results. This points to the importance of another study on Tanzania to establish the direction of causality among the three variables. Further, the dearth of studies that investigated the causality between poverty, remittances, and economic growth, makes this study both timely and crucial. The findings will allow policy makers in Tanzania to determine which factor(s) to influence first to achieve positive developments in the other variables. Economic growth and poverty reduction have been the national policy in Tanzania for a long time, recurring in related policies.

3. Estimation techniques

An ARDL approach to cointegration and an ECM-Granger causality test were employed to investigate the causality between remittances, poverty, and economic growth. The ARDL approach, expanded by Pesaran, Shin, and Smith (2001), was selected for its numerous advantages, which include robustness in small samples and the ability to use a combination of variables integrated on order zero and one in the same model. In addition, the results from the ARDL approach apply in the short and the long run, thus adding insights that policy makers will find useful when designing policy and linking policy impact to timeframes.

3.1. Variables

The main variables of interest were poverty (proxied by household consumption expenditure per capita), economic growth (proxied by GDP growth), and remittances (measured as a percentage of GDP). Household consumption expenditure per capita captures income poverty (World Bank, 2001; Meyer and Sullivan, 2003). Several studies have also used this proxy to measure poverty reduction (see Ravallion, 2001; Rehman and Shahbaz, 2014; Magombeyi and Odhiambo, 2018; Musakwa, Odhiambo and Nyasha, 2021). In addition, trade openness, financial development, and education were added to the model to derive a multivariate Granger causality framework. Table 1 provides a summary of the description of the variables and the sources of the data used in the study.

Table 1: Variable Definition

Variable	Description	Notation	Source
Poverty	Household consumption expenditure	HCE	World Development Indicators
Remittances	Remittance inflows	REM	World Development Indicators
Education	Primary school gross enrolment	EDU	World Development Indicators
Economic growth	GDP growth rate	EG	World Development Indicators
Financial development	Domestic credit to private sector by banks as a percentage of GDP	FD	World Development Indicators

Trade openness	Exports and imports as a percentage of GDP	TOP	World Development Indicators
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The ARDL model specifications are presented in equations 1–6.

ARDL model specification to cointegration (HCE, REM, EG, EDU, TOP, FD):

$$\begin{aligned} \Delta HEC_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=0}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=0}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=0}^n \varphi_{4i} \Delta EDU_{t-i} \\ & + \sum_{i=0}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=0}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HEC_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\ & + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{1t} \dots \dots \dots (1) \end{aligned}$$

$$\begin{aligned} \Delta REM_t = & \varphi_0 + \sum_{i=0}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=0}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=0}^n \varphi_{4i} \Delta EDU_{t-i} \\ & + \sum_{i=0}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=0}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HCE_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\ & + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{2t} \dots \dots \dots (2) \end{aligned}$$

$$\begin{aligned} EG_t = & \varphi_0 + \sum_{i=0}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=0}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=0}^n \varphi_{4i} \Delta EDU_{t-i} \\ & + \sum_{i=0}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=0}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HEC_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\ & + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{3t} \dots \dots \dots (3) \end{aligned}$$

$$\begin{aligned} EDU_t = & \varphi_0 + \sum_{i=0}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=0}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=0}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\ & + \sum_{i=0}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=0}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HEC_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\ & + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{4t} \dots \dots \dots (4) \end{aligned}$$

$$\begin{aligned} TOP_t = & \varphi_0 + \sum_{i=0}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=0}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=0}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=0}^n \varphi_{4i} \Delta EDU_{t-i} \\ & + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=0}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HCE_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\ & + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{5t} \dots \dots \dots (5) \end{aligned}$$

$$\begin{aligned}
FD_t = & \varphi_0 + \sum_{i=0}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=0}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=0}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=0}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=0}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \beta_1 HCE_{t-1} + \beta_2 REM_{t-1} + \beta_3 EG \\
& + \beta_4 EDU_{t-1} + \beta_5 TOP_{t-1} + \beta_6 FD_{t-1} + \gamma_{6t} \dots \dots \dots (6)
\end{aligned}$$

HCE = poverty proxy, REM = remittances inflows as a percentage of GDP; EC = economic growth measured by rate of change of GDP; EDU = education measured by gross primary enrolment; TOP = trade openness measured by exports plus imports as a percentage of GDP; and FD = financial development measured by domestic credit to the private sector by bank as a percentage of GDP, φ_0 is a constant; $\varphi_1 - \varphi_6$; $\beta_1 - \beta_6$ are coefficients; and $\gamma_1 - \gamma_6$ are error terms.

ECM-based Granger causality model specifications for equations 1–6 can be specified as:

$$\begin{aligned}
HCE_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \mu_1 ECM_{t-1} \\
& + \mu_{1t} \dots \dots \dots (7)
\end{aligned}$$

$$\begin{aligned}
REM_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \mu_2 ECM_{t-1} \\
& + \mu_{1t} \dots \dots \dots (8)
\end{aligned}$$

$$\begin{aligned}
EG_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \mu_3 ECM_{t-1} \\
& + \mu_{1t} \dots \dots \dots (9)
\end{aligned}$$

$$\begin{aligned}
EDU_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \mu_4 ECM_{t-1} \\
& + \mu_{1t} \dots \dots \dots (10)
\end{aligned}$$

$$\begin{aligned}
TOP_t = & \varphi_0 + \sum_{i=1}^n \varphi_{1i} \Delta HCE_{t-i} + \sum_{i=1}^n \varphi_{2i} \Delta REM_{t-i} + \sum_{i=1}^n \varphi_{3i} \Delta EG_{t-i} + \sum_{i=1}^n \varphi_{4i} \Delta EDU_{t-i} \\
& + \sum_{i=1}^n \varphi_{5i} \Delta TOP_{t-i} + \sum_{i=1}^n \varphi_{6i} \Delta FD_{t-i} + \mu_5 ECM_{t-1} \\
& + \mu_{1t} \dots \dots \dots (11)
\end{aligned}$$

EG	-2.148	-2.566	-8.092***	-7.460***
EDU	-1.384	-1.387	4.889***	4,902***
TOP	-2.431	-1.085	-3.478**	-3.425*
FD	-1.603	-2.545	-6.505***	-6.807***

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

The unit root test reported in Table 2 shows that all the variables included in the model are stationary at the first difference, irrespective of the unit root test used. To proceed with the analysis, a cointegration test was conducted to confirm long-run relationships among the variables in different functions. The results of the cointegration test are presented in Table 3.

Table 3: Cointegration results

Dependent variable	Function	F-statistic	Cointegration status			
Panel A: Model						
HCE	F (HCE REM,EG,EDU, TOP, FD)	4.604**	Cointegrated			
REM	F (REM HCE,EG,EDU, TOP, FD)	2.116	Not cointegrated			
EG	F (EG REM,HCE,EDU, TOP, FD)	5.461***	Cointegrated			
EDU	F (EDU REM,EG,HCE, TOP, FD)	3.399*	Cointegrated			
TOP	F (TOP HCE,REM,EG,EDU, FD)	7.937***	Cointegrated			
FD	F (FD REM,EG,EDU, TOP, HCE)	3.080	Not cointegrated			
Asymptotic critical values (unrestricted intercept and no trend)						
Critical values	1%		5%		10%	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
	3.41	4.68	2.62	3.79	2.26	3.35

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

The cointegration results presented in Table 3 indicate that four of the six functions have variables with a long-run relationship. This is confirmed by the F-statistics on the HCE, EG, EDU, and TOP functions, which are significant at 1%, 5% and 10% level of significance. To proceed with the analysis, for those functions where no cointegration was confirmed, short-term causality was estimated, while for those functions with cointegration, both short- and long-run causality were analysed. The causality results are reported in Table 4.

Table 4: ECM-based causality results for Model 1 (HCE as a poverty proxy)

Dependent variable	HCE as a measure of poverty						ECM t-statistics
	F-statistic [probability value]						
	Δ HCE	Δ REM	Δ EG	Δ EDU	Δ TOP	Δ FD	
Δ HCE	-	4.054** [0.065]	0.556 [0.584]	4.574** [0.044]	3.759* [0.066]	0.949 [0.402]	-0.336*** [-6.021]
Δ REM	8,316*** [0.002]	-	1.132 [0.230]	3.022* [0.097]	3.308* [0.083]	1.193 [0.323]	-

ΔEG	0.480 [0.539]	0.940 [0.343]	-	1.388 [0.251]	0.057 [0.814]	9.595*** [0.005]	-0.694*** [-5.883]
EDU	0.384 [0.542]	3.965* [0.060]	3.684* [0.054]	-	3.498* [0.050]	0.020 [0.889]	-0.171*** [-6.783]
ΔTOP	4.002** [0.038]	5.280** [0.027]	7.607*** [0.003]	5.757** [0.026]	-	6.789*** [0.014]	-0.476*** [-5.705]
ΔFD	8.316*** [0.002]	0.276 [0.604]	1.132 [0.300]	3.021* [0.097]	3.308* [0.083]	-	-

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

The results reported in Table 4 confirm a bidirectional causality between poverty measured by household consumption expenditure per capita and remittances in the short run and a unidirectional causal flow from remittances to household consumption expenditure per capita in the long run. This finding supports the mutually reinforcing effects of poverty and remittances in the short run, confirming the United Nations' support for remittances as a source of developmental finance. This finding is not unique to Tanzania alone; other studies found the same results (see Yasmin et al., 2015; Gaaliche and Gaaliche, 2014). A unidirectional causal flow from HCE to remittances confirmed in the long run is consistent with the proposition that migrants tend to remit back home due to altruistic motives (see Ratha, 2013; Lucas and Stark, 1985). When they leave behind their struggling families, migrants are likely to remit more frequently and in significant amounts, to alleviate the hardships of their loved ones. The study found no causal relationship between remittances and economic growth in the short run and the long run. Previous studies have shown that if remittances are used in non-productive consumption, the impact of remittances on the economy could be minimal. No causality was also confirmed between economic growth and household consumption expenditure per capita, regardless of the time frame considered.

Other results reported in Table 4 confirm no causality between remittances and financial development. The study also found a unidirectional causal flow from financial development to economic growth in the short run and in the long run. This finding confirms a supply-led hypothesis for Tanzania. A unidirectional causal flow was confirmed from household

consumption expenditure per capita to financial development in the short run. Thus, the level of poverty has a direct influence on the level of financial development in Tanzania. The higher the level of poverty, the lower the level of financial development due to limited demand for sophisticated financial services. Another unidirectional causal flow was found from financial development to trade openness in both the short and the long. This finding supports the ability of financial development to support more advanced financial transactions that involve Tanzania and other countries. The study found a unidirectional causal flow from education to financial development in the short run. This finding points to the fact that the level of education plays an instrumental role in the transactions that Tanzanians execute and the level of demand for new and improved financial services and products. A bidirectional causality between trade openness and remittances in the short run and a unidirectional causal flow from remittances to trade openness in the long run was confirmed. The results confirmed a mutually reinforcing effect between the two, pointing to the importance of trade openness to remittances level in Tanzania. The more open the economy is to international transactions, the more favourable remitting channels are created, which in turn encourages emigrants to remit more as the process is made cheaper and more convenient. The study found a bidirectional causality between remittances and education in the short run and a unidirectional causal flow from remittances to education in the long run. This finding supports the positive role that remittances play in increasing the ability of remittance-receiving countries to increase consumption and investment expenditure, which would not be possible if the families did not receive remittances (see Ratha, 2013). A unidirectional causal flow from economic growth to trade openness in the short run and in the long run was also found. Another unidirectional causal flow was confirmed from economic growth to education in the short run and in the long run. This supports the notion that high economic growth levels allow the government to set more funds to support education and enables households to finance education requirements. A bidirectional causality

was confirmed between household consumption expenditure per capita and trade openness and between education and trade openness in the short and long run. The study found a unidirectional causal flow from education to poverty in the short run and in the long run. Thus, the study confirmed the important role that education plays in reducing poverty by enabling households to improve their educational level. This also allows them to get better-paying jobs resulting in high income levels that increase their ability to access social services, among other important needs, thereby reducing poverty.

The results from this study confirmed the reinforcing effect between remittances and poverty in Tanzania. This points to the importance of remittances in achieving poverty reduction and the important role that high poverty levels play in attracting more remittances, which confirms the altruism motive of remittance (see also Ratha, 2013; Lucas and Stark, 1985).

Thus, policies that support remittances will go a long way in alleviating poverty as emigrants send more money back home. However, the study failed to find any causal link between remittances and economic growth, which could reflect the predominant use of informal channels of remitting and lack of knowledge on other uses of remittance besides consumption. These channels result in most of the remittance received remaining in the informal sector. The lack of causality between economic growth and poverty in Tanzania suggests a weak link between economic growth and poverty.

7. Conclusion

In this study, the causality between poverty, remittance, and economic growth was examined for Tanzania, using annual data from 1990 to 2020. To fully specify the model, intermittent variables such as trade openness, education, and financial development, were added to form a multivariate framework. The household consumption expenditure per capita was used as a

proxy for poverty. Using the ARDL bounds approach to cointegration and the ECM-based Granger causality test, the study found a bidirectional causality between remittances and poverty in the short run and a unidirectional causal flow from remittances to poverty in the long run. The study found that remittances play an important role in poverty reduction and the reinforcing effect poverty has in encouraging more remittances. No causality was confirmed between remittances and economic growth and between economic growth and poverty. Therefore, it can be concluded that remittances play a pertinent role in poverty reduction in Tanzania. Based on the finding of this study, it is recommended that Tanzania continues with policies that support remittances to increase remittance inflows, which are essential in reducing poverty. Given that no causality was found between remittance and economic growth, it is recommended that Tanzania continue to make remittance channels more accessible and cheaper to ensure more remittances are received using the formal channels. It is further recommended that the Tanzania government complements Vision 2026 with policies that address inequality and economic empowerment of the poor so that the poor can benefit from economic growth.

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